# Report Documentation Page

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**Approved for public release; distribution unlimited**

13. SUPPLEMENTARY NOTES

14. ABSTRACT
**303 Stainless Steel Aircraft seal ring having a very small face groove at multiple depths and very thin walls on the OD and ID. The current process produces 18 pieces per hour and uses three different tools to process the face groove. The process includes a rough groove tool, a finish groove tool, and a necking tool for an undercut. The machine spindle is limited to 2000-RPM max.**

15. SUBJECT TERMS
**303 Stainless Steel Aircraft seal ring; NCDMM; Success Stories; National Center for Defense Manufacturing and Machining**

| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
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| a. REPORT | b. ABSTRACT | c. THIS PAGE | | | |
| **unclassified** | **unclassified** | **unclassified** | **1** | **1** | |

# Seal Ring for F-18 Hornet

**NCDMM Project No. 03-0002-06**

Technical Report

## PROBLEM / OBJECTIVE

303 Stainless Steel Aircraft seal ring having a very small face groove at multiple depths and very thin walls on the OD and ID. The current process produces 18 pieces per hour and uses three different tools to process the face groove. The process includes a rough groove tool, a finish groove tool, and a necking tool for an undercut. The machine spindle is limited to 2000-RPM max.

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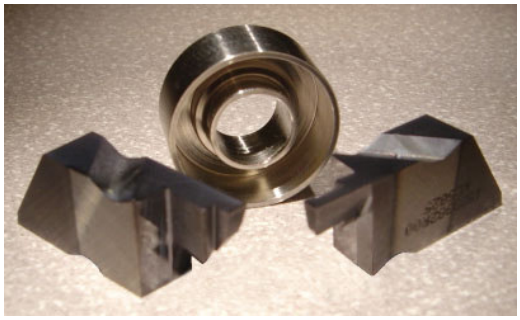

Stainless Steel Ring with Carbide Form-ground Inserts

## ACCOMPLISHMENTS / PAYOFF

***Process Improvement***

Applied form-ground carbide inserts with a thicker cross section to provide stronger radial relief. The roughing tool was ground to meet the form of the component, eliminating the need to generate the groove form by programming. The finishing tool was ground to form including a relieved area for cutting the undercut portion to eliminate the need for a separate necking tool. The tool path was also changed to accommodate the thin walls. The tool path started from the face of the part working towards the chuck of the machine to avoid side-loading insert. If side loading was required the feed rate was reduced to reduce the cutting pressure.

***Implementation and Technology Transfer***

The process and tool recommendations will provide immediate improvements and costs reductions:

- Increased quality
- Reduced tool usage

***Implementation and Technology Transfer Cont'd.***

- Higher SFM attained
- Reduces tool path, which saves machine time
- Application of tailored form tools resulted in reduced cycle times
- Elimination of in-house fabricated form tools
- The total parts per hour, has gone from 18 to 30 an improvement of 66%

## PROJECT RESULTS

| | |
|---|---|
| NCDMM Funded Effort | $7.5K |
| Manufacturing Cost Savings* resulting from productivity gains, reduction in scrap, improved quality, and extended operational life. | $150K |
| **RETURN ON INVESTMENT (ROI)** | **20:1** |

**Based on improved manufacturing process development, application of multi-operation tailored tooling, fine-tuned application parameters, and the elimination of less rigid set-ups and inconsistent in-house grinding of special "stick" tool bits. Savings over (4) various part numbers, with expansion of savings likely over additional part numbers.*

## TIME LINE / MILESTONE

Start Date.....June 03
End Date ..... August 03
Implementation Date.....Oct 03

*For additional information concerning this project, contact the NCDMM at* www.ncdmm.org